WHAT IS CLAIMED IS:

1. A surface processing method of a sample having a metal of high melting point or multilayer film comprising at least metal of high melting point and semiconductor deposited on a substrate, the method comprising steps of:

installing said sample on a sample board in a vacuum container,

generating a plasma of a gas containing at least halogen atom inside said vacuum container,

applying a radio frequency bias voltage having a frequency ranging from 200 kHz to 20 MHz on said sample board, and

controlling a periodic on—off of the radio frequency bias voltage with an on—off control frequency ranging from 100 Hz to 10kHz.

2. A surface processing method according to Claim 1, wherein said gas is mixed gas consisting of at least a gas containing chlorine atom and a containing oxygen atom, and said sample is treated by said plasma.

3. A surface processing method according to Claim 2, wherein said sample to be treated is maintained at the temperature not less than 50 degrees Celsius.

4. A surface processing method according to Claim 1, wherein said gas is mixed gas consisting. of at least a gas containing fluorine atom and a containing oxygen atom, and said sample is treated by said plasma.

5. A surface processing method according to Claim 4, wherein said sample to be treated is maintained at the temperature not exceeding 20 degrees Celsius.

6. A surface processing method according to Claim 1, wherein said multilayer film of said sample is formed by lamination of at least metal of tungsten film and semiconductor of polycrystalline silicon film.

7. A surface processing method according to Claim 6, further characterized in that tungsten nitride or titanium nitride film is provided between said tungsten film and polycrystalline silicon film.

8. A surface processing method according to Claim 1, further characterized in that a mask without containing carbon as major component is formed on said metallic film.